

The Trafalgar millipede *Lissodesmus johnsi* Mesibov, 2006 (Diplopoda: Polydesmida: Dalodesmidae)

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Abstract

Lissodesmus johnsi, *L. dignomontis* and *L. tarrabulga* are endemic to the Strzelecki Ranges in Gippsland, Victoria, where the three species may once have formed a distribution mosaic. *Lissodesmus johnsi* now appears to be restricted to c. 60 ha over three sites in the western Strzelecki hills, which were almost entirely cleared of their forest cover in the late 19th and early 20th centuries. (*The Victorian Naturalist* 124 (4), 2007, 197-203)

Introduction

Some time in August 1890, the 70-year-old William Kershaw – Victorian entomologist and field naturalist – collected several species of millipedes ‘near Trafalgar’ in Gippsland. He preserved the specimens in alcohol and deposited them in the National Museum of Victoria.

Seventy-odd years later, the specimens were carefully examined by the visiting New Zealand specialist Peter Johns.

Although Johns was reasonably certain that one of the Trafalgar millipedes was in the same genus as a species earlier described from Melbourne, he decided not to name it as a new species. Instead, he described and illustrated it as ‘*Pseudoprionopeltis (Australopeltis) sp.*’ (Johns 1964)

Another 40 years passed, and *Australopeltis* had meanwhile been

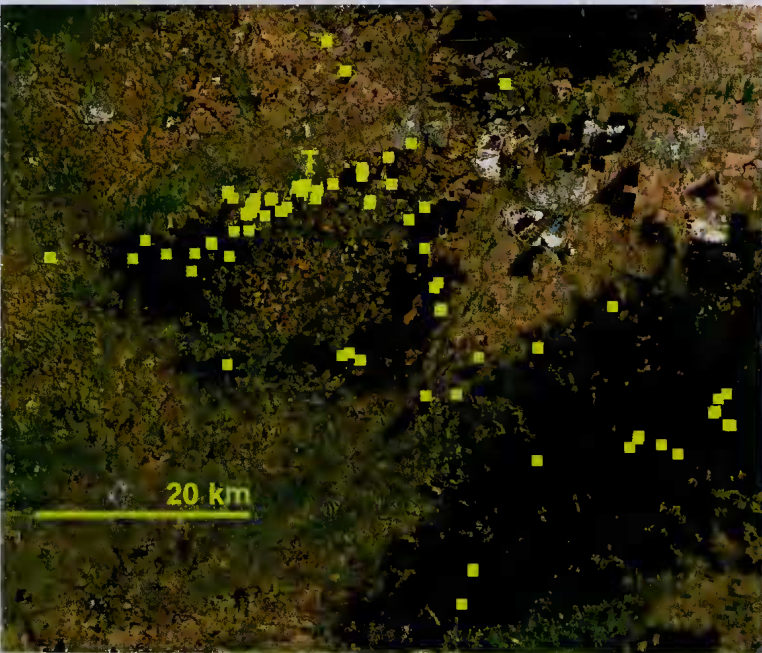


Fig. 1. *Lissodesmus* search sites (yellow squares) in west and south Gippsland. Background is natural-colour Landsat image from 2000. Dark green patches are forest plantations and native forest; remainder is farmland and urban and industrial clearings. T = Trafalgar.

replaced by the older name *Lissodesmus* (Jeckel 1983). I was examining specimens for a revision of *Lissodesmus* when I came across the Kershaw material in Museum Victoria in Melbourne. The Trafalgar species was most unusual, evidently a *Lissodesmus* but apparently a highly derived one. I needed a few more specimens for a proper description. Was the millipede still living, I wondered, 'near Trafalgar'?

The short answer was 'yes' and I obtained my specimens, later naming the species *Lissodesmus johnsi* (Mesibov 2006). However, the taxonomic and conservation issues arising from this study were more complicated than I anticipated. The Trafalgar millipede is one of three remarkable species confined to Gippsland's Strzelecki Ranges. It is also, I suspect, closer to extinction than any other Victorian millipede.

Millipede hunting

Between September 2004 and July 2006 I spent 26 field days searching for *Lissodesmus* at 86 sites in west and south Gippsland (Fig. 1).

Unlike the familiar Portugese millipede and many native millipedes, *Lissodesmus* species require constant high humidity. They live in wet rotting wood and moist humus-rich soil. In Victorian wet forest where lyrebirds are absent, *Lissodesmus* species can be found in deep leaf litter on the forest floor. Where lyrebirds regularly disturb this microhabitat by raking, *Lissodesmus* are very hard to find outside of logs.

Victoria has 11 known *Lissodesmus* species, i.e. the 10 described or redescribed in Mesibov (2006) and a new species discovered in the Grampians in 2005. Most are pink or reddish in colour and up to 20 mm long as adults. Like most of the 18 known Tasmanian *Lissodesmus* species, the Victorian species typically have fairly small ranges, but *L. martini* is widespread and abundant from Melbourne's eastern suburbs to Dargo.

I found *L. martini* as far south as Yinnar in the Morwell River valley, but in the Strzelecki Ranges it is replaced by a closely related species, *L. gippslandicus*. The two

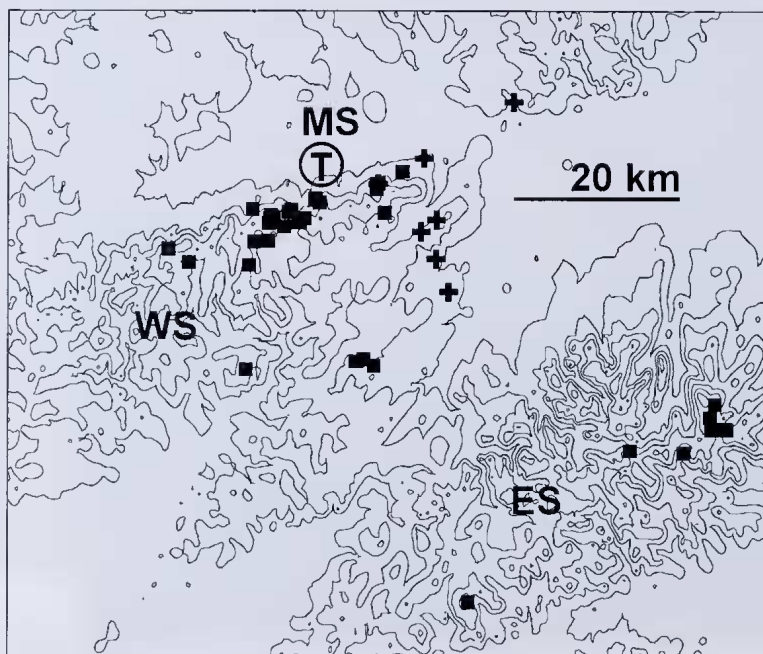


Fig. 2. Localities for *Lissodesmus gippslandicus* (squares) and *L. martini* (crosses) in west and south Gippsland. Map extent is the same as in Fig. 1. Contours are at 100 m intervals. WS = western hills of Strzelecki Ranges, ES = eastern hills of Strzelecki Ranges, MS = Moe Swamp, T = Trafalgar.

distributions meet but overlap only slightly (Fig. 2). This spatial arrangement, known as *parapatry*, is common in millipedes, and many genera, such as *Lissodesmus*, form species mosaics in the landscape (Mesibov 2003).

The *johnsi* group

Three closely related *Lissodesmus* species are remarkably different from other Victorian and Tasmanian *Lissodesmus*. The three are here called the *johnsi* group, and comprise *L. dignomontis*, *L. johnsi* and *L. tarrabulga* (Mesibov 2006). Adults in this group are small, pale and oddly juvenile in some anatomical details (Fig. 3).

The *johnsi* group are also set apart geographically, occurring only in the Strzelecki Ranges, where their distributions may once have formed a mosaic (Fig. 4). The boundaries between mosaic tiles can be remarkably narrow in millipedes, with overlap zones less than 100 m wide. I was fortunate to find a sharp boundary of this kind between *L. dignomontis* and *L. johnsi* in a bush remnant at Yarragon South, just southwest of Trafalgar.

To a greater degree than in most other Victorian millipedes, the *johnsi* group are microhabitat-specific. They appear to be much less tolerant of dry conditions than the co-occurring *L. gippslandicus* (Fig. 3), and have not yet been found in forest where rotting logs are absent, or where repeated hot burning has greatly reduced organic matter in the topsoil.

Local history

Twenty years before William Kershaw's visit, the western Strzelecki hills were covered in tall, wet eucalypt forest, with a dense understorey of smaller trees, shrubs and treeferns, or of tall sedges (Adams 1978; TJ Coverdale in Shire of Korumburra 1966). Travellers through this hill forest often noted the presence of huge eucalypt logs lying on the ground (Adams 1978).¹ The Moe Swamp, north of the hills, was at least partly covered in tea-tree species, with scattered eucalypts (Adams 1978). Between the Swamp proper and the hills were broad wooded flats.² A very large area 'near Trafalgar' was good *L. johnsi* habitat in 1870.

A few years later the first settlers arrived. The subsequent clearing of the forested hills of south Gippsland has been documented in extraordinary detail in a collection of first-hand reminiscences, *The Land of the Lyre Bird* (Shire of Korumburra 1966). First, the forest understorey and the younger eucalypts were felled, an operation called 'scrub cutting'. On a suitable day the following summer, the felled material was burned, and 'picking up' began, i.e. the collection and burning of 'everything in the shape of timber except the standing stumps' (WHC Holmes in Shire of Korumburra 1966).

Clearing and burning were very thorough.^{3,4} Clearing often began along creek-lines and proceeded upslope, and creek gullies, which might have served as litter fauna refuges during natural wildfires, were used as kilns to burn logs (WHC Holmes in Shire of Korumburra 1966; G. Matheson in Shire of Korumburra 1966).

In the exceptionally hot and dry summer of 1898, west and south Gippsland were swept by intense bushfires. Many of the large eucalypts which had been ringbarked and left standing on the developing farmlands were burned down. Although lives, livestock, buildings, fences and sown pastures were lost in the fire, 'it had done some good in clearing up a lot of old logs and undergrowth, and in burning down and burning away thousands of big trees' (TJ Coverdale in Shire of Korumburra 1966).⁵

Settlers took advantage of the 1898 fires to do further 'picking up'.⁶ Rabbits arrived in the district at about the same time (Adams 1978), and rabbit control included burning the stumps and logs used by rabbits for shelter. Earlier in the 1890s, work began on clearing and draining the Moe Swamp, and settlement on the formerly wet flats proceeded quickly.⁷

For a social and economic history of the settlement of the northern portion of the *johnsi* group range, see Adams (1978). The key point is that much of the formerly forested area had been cleared, burned and converted to mainly treeless, logless farmland within 30 years of settlement.⁸ By the 1920s, some of that land had become 'densely covered with bracken fern and blackberry bramble' (report quoted in Adams 1978), but very little was allowed



Fig. 3. Adult females of *Lissodesmus gippslandicus* (top) and *L. johnsi* (bottom).

to regenerate to native forest in the following decades. Instead, steep or derelict farmland was planted with *Pinus radiata* and, more recently, *Eucalyptus globulus*. Although some other native millipedes have successfully colonised the older plantations, I have not yet found any of the *johnsi* group in plantation litter.

Lissodesmus johnsi today

Over the past 50 years, as evidenced by aerial photographs, native forest cover has increased in the farmed landscape of the western Strzelecki hills. Much of this increase has been in and adjoining deep gullies from which stock are now largely excluded. I have carefully searched a number of these 'new' wet forest patches near Trafalgar without finding *L. johnsi*. The most likely explanation is that the species became locally extinct when its log and topsoil shelters were burned away in the late 19th and early 20th centuries. Dispersal of *L. johnsi* to these 'new' patches is blocked by wide barriers of pasture.

I have so far located only three populations of *L. johnsi*, all 'near Trafalgar' (Fig. 5). A small population occurs on a few hectares of privately owned wet forest near an old sawmill site at Yarragon South, on a steep south-facing slope above a farm dam. A second small population occupies a portion of an 8 ha patch of privately owned riparian forest, also at Yarragon South; *L.*

johnsi occurs here in parapatry with *L. diginomontis*.

The largest known population is in Uralla Nature Reserve (UNR) in Trafalgar. The 45 ha Reserve is owned by Trust for Nature and managed by a committee of volunteers under the auspices of Baw Baw Shire. A detailed history of the property is not yet available, but it is known to have been used by charcoal burners and may thus have been an informal timber reserve. Within UNR, *L. johnsi* is found in rotting logs both in shady wet forest close to flowlines and in open forest on ridgelines.

The UNR forest is contiguous with privately owned forest to the south and east and with Shire forest on the Trafalgar tip site to the west. I have searched these surroundings for *L. johnsi* without success, although *L. gipplandicus* and other native millipedes are present. The surrounding forest appears to have far fewer rotting logs than UNR, and may be largely 'new' forest in the sense noted above, i.e. forest regenerated on formerly cleared land. UNR and the other two known *L. johnsi* sites, although burned in the past, were apparently never completely cleared for agriculture.

Conservation recommendations

The UNR forest is probably large enough to support the existing population of *L. johnsi* indefinitely. The eucalypt over-

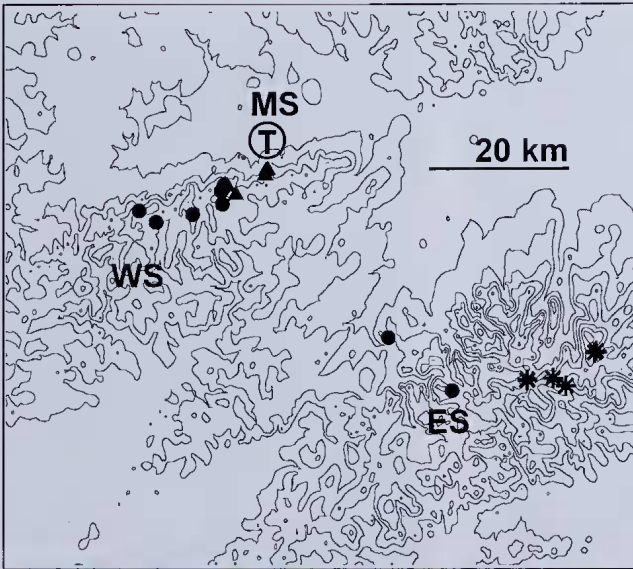


Fig. 4. Localities for *Lissodesmus dignomontis* (circles), *L. johnsi* (triangles) and *L. tarrabulga* (stars) in west and south Gippsland. Map extent is the same as in Fig. 1. Contours are at 100 m intervals. WS = western hills of Strzelecki Ranges, ES = eastern hills of Strzelecki Ranges, MS = Moe Swamp, T = Trafalgar.

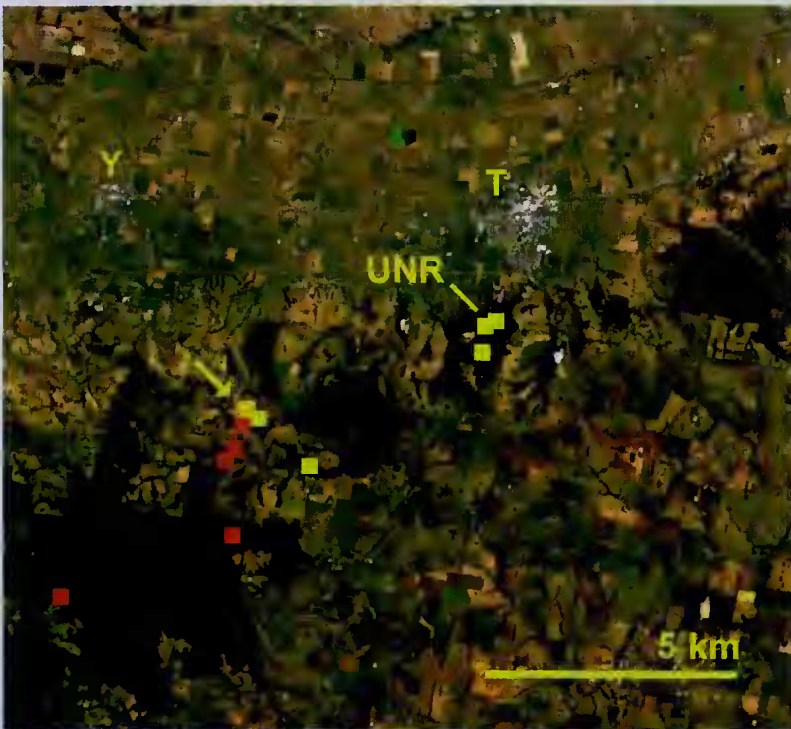


Fig. 5. Localities for *Lissodesmus dignomontis* (red squares) and *L. johnsi* (yellow squares) near Trafalgar (T). Background is natural-colour Landsat image from 2000. Dark patches are forest plantations and native forest, remainder is farmland and urban clearings. Uralla Nature Reserve (UNR) occupies the north-central portion of its forest patch. *Lissodesmus dignomontis* and *L. johnsi* occur in parapatry in the forest remnant marked with an arrow, south of Yarragon (Y).

storey is uneven-aged, and natural treefalls and gap- or fire-promoted regeneration should provide an ongoing source of rotting logs for *L. johnsi* microhabitat. Clearing trees and removing firewood from any part of UNR would reduce this critically important rotting wood resource.

The rotting wood resource is also at risk from an intense ground fire. The best protection against such a fire is periodic fuel reduction burning of standing shrubs, grasses and sedges, carried out under conditions when ground-surface litter and logs are moist enough not to burn.

I am reluctant to recommend translocation of *L. johnsi* to small forest patches elsewhere in the western Stzrelecki hills. It is not yet clear how mosaic parapatry is maintained in millipedes (Mesibov 2003), and it is possible that translocation will either fail because of the presence of the sister species *L. dignomontis*, or will succeed to the detriment of the latter.

Conclusion

It is a lucky historical accident that the Trafalgar millipede *Lissodesmus johnsi* is still extant, c. 115 years after its discovery. Virtually the whole of what is likely to have been its former range, north, south and east of Trafalgar, was cleared for agriculture and is now pasture, cropland or forest plantation. While its sister species *L. dignomontis* and *L. tarrabulga* are likely to persist in large blocks of native forest elsewhere in the *johnsi* group mosaic, *L. johnsi* will avoid extinction only if the core of its remaining range, Uralla Nature Reserve, is managed so as to maintain a well-dispersed stock of rotting logs within standing native forest.

Acknowledgements

I am very grateful to the many landowners in west Gippsland who gave me access to their properties, and especially to Geoff and Jackie Tims, Ken and Wendy Savage, and John Poppins of Yarragon South for their support, hospitality and local knowledge. Historical information was sourced with the assistance of Jean Huffer of the Trafalgar and District Historical Society, and of staff at the State Library of Victoria and the Royal Historical Society of Victoria. A number of GIS layers and a 20 m DEM for my study area were kindly provided by the Department of Sustainability and Environment, Victoria. The Landsat image in Fig. 1 is from an image layer in the National

Carbon Accounting Toolhox and Data Viewer, Australian Greenhouse Office. The contours in Figs. 2 and 4 were generated from the 9 second digital elevation model of Australia, version 2.1, Geoscience Australia. I thank an anonymous referee for helpful comments on a draft of this paper. The *L. johnsi* study was funded by the author.

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Notes

¹ 'After a few days we started off one morning to visit our selection, about two miles further on. We followed a survey line (now Sanders's lane), running in the direction we wished to go. Through the dense forest we pushed our way - we walked along logs, climbed over logs, crept under logs, crawled through logs, but seldom or never did our feet touch the ground.' (W. Johnstone in Shire of Korumburra 1966, p. 213)

² 'The Northern Gippsland railway line, after passing through Warragul, runs into a stretch of rich grey soil flats, the timber being mostly white gum, with occasional specimens of blackwood. Settlement in this district, which has railway centres at Darnum, Yarragon and Trafalgar, on what is known as 'the flats' is of comparatively recent date.' (*Trafalgar and Yarragon Times*, 19 August 1902, p. 1)

³ 'It was perhaps a grave error to destroy all this valuable timber... Yet most of us deemed it inadvisable to leave even one acre of standing

timber.' (M. Hansen in Shire of Korumburra 1966, p. 218)

⁴ 'Total clearing of the land was made easier when 'stoving' was found to be an effective way of getting rid of tree stumps. This method was to remove the earth from the base, build a stack of wood around and set fire to it. The resulting heap of glowing coals was completely covered with tightly packed earth, and kept covered. This produced a hot, slow burning fire which incinerated a great part of the standing trunks and gradually crept along underground destroying most of the giant root system. This would take months, and the selector, carrying a lantern in his hand, would go around them at night when he was able to see if any needed covering with more earth.' (Back to Yarragon Committee 1978, p. 10)

⁵ 'The only benefit the [1898] fires did was to sweep many paddocks clean of timber that would otherwise have taken years to clear.' (F.P. Elms in Shire of Korumburra 1966, p. 341)

⁶ 'Deprived of the more profitable timber industry [following the 1898 bushfires], settlers were perforce compelled to give more attention to agriculture. To this end the task of clearing the land of blackened butts and trunks, by bringing together the charred timber and remains in heaps around the bases of dead trees, and lighting covered fires until everything was burned, was vigorously pursued.' (Daley 1960, p. 137)

⁷ 'Trafalgar is beautifully situated almost at the foot of the Strzelecki Ranges, and a fine view can be obtained from the summit of one of them, for as the tourist looks out from his

exalted position over the great expanse of country spread out before him, and sees the numerous square cultivation paddocks, green as a leek, and the numbers of brightly-painted homesteads dotted about in all directions, he can scarcely realise its former wildness, when it was a vast morass, covered with rough grass and impenetrable scrub, presenting a striking contrast to the aspect of the place to-day...' (Smith 1905, p. 574)

⁸ 'What a pleasing contrast was presented between the first original homestead of the veteran pioneer (surrounded by forest, inhabited by dingoes, lyre birds, wallaby's, [sic] and other wild animals and birds, with no means of ingress and egress save a narrow pack track winding over gullies and wooded ranges...) and the smiling homestead of the prosperous farmer or dairy-man of to-day. Greenfields, studded with contented dairy cattle, is to-day the prevailing order of things, with comfortable cow-sheds and dairy houses fitted with up-to-date modern appliances, all tending to show the marked progress and wonderful developements [sic] which has [sic] taken place under the steadfast and persistent efforts of the old and new pioneer, a complete transformation from non-productive country to a prosperous community.' (Report of a lantern-slide lecture by pioneer settler Frank Geach in the Mechanics Institute, Trafalgar; *Trafalgar and Yarragon Times*, 11 November 1902, p. 4)

Received 22 March 2007; accepted 3 May 2007

One hundred Years Ago

THE MOSQUITO

... When a mosquito bites, it places the end of the lower lip on the victim's hand, and shakes its head, thus sawing through the skin. The lower lip now bends up near the head, and so the end of it is raised, while the six piercers sink into the flesh. The muscular throat now acts as a pump, and the blood is speedily pumped up.

In return for our kindness in giving the mosquito blood, she gives us with the saliva two things we decidedly object to. First there is poison, which produces a most irritating effect on some people, while others seem to be immune to it. Secondly, there are very tiny microscopic animals, which give rise to the deadly diseases already mentioned. The mosquito is the involuntary, but necessary, agent in the transmission of these animals; but why she has poison, which apparently serves no useful purpose, is a puzzle.

From *The Victorian Naturalist* XXIII, p 216, March 1907